Chapter 3. Hydrology

The Spokane Valley-Rathdrum Prairie Aquifer is known to be one of the most prolific aquifers in the United States. This aquifer is the major source of drinking water for the cities of Spokane, Post Falls, Coeur d'Alene and Hayden Lake, as well as rural residents living over the aquifer.

The earliest studies of the Spokane Valley-Rathdrum Prairie aquifer were by Fosdick (1931) and Newcomb (1933), both of these authors outlined the basic geologic, physiographic, and hydrologic features of the aquifer and its recharge area. Newcomb concluded that a buried ridge of basalt near Spokane causes the ground-water flow to divide, one part moving northward into the Hillyard Trough, another part moving westward into the basalt and a third part moving through the Miocene Latah Formation into underlying basalt. Newcomb indicated that the Spokane River is a losing stream between Post Falls, Idaho, and Trent, Wash., and a gaining stream from Trent to Spokane. Newcomb felt that Pend Oreille Lake is the major source of recharge to the aquifer, while Fosdick suggested that precipitation directly over the aquifer and in adjacent highlands is the source.

Piper and Huff (1943), Huff (1943), and Piper and La Rocque (1944), studied the aquifer in more detail. Piper and Huff measured water levels in a series of wells and made estimates of the hydraulic gradient in different parts of the aquifer. They concluded that Hayden, Coeur d'Alene, and Pend Oreille Lakes, and the Spokane River are the major sources of recharge, with Pend Oreille Lake making the greatest contribution while the estimated discharge from the aquifer to springs and rivers was 900 ft^3/s. Huff estimated the total discharge from the aquifer to be about 1,100 ft^3/s, which included his estimated total pumpage of 100 ft^3/s in 1942.

In 1944 Piper and La Rocque estimated total flow through the aquifer to be about 1,000 ft^2/s. They also discussed Pend Oreille Lake as a possible recharge source, but not as a major source.

Nace and Fader (1950) tabulated all data then available in U.S. Geological Survey files on wells tapping the aquifer. In unpublished reports of the U.S. Bureau of Reclamation, Lenz (1950), Meneely (1951), and Anderson (1951), studied various aspects of different parts of the aquifer with the general intention of determining the sources and volumes of water that could be used for irrigation in the Rathdrum Prairie area. Lenz estimated water requirements, seepage losses, and storm flows that would be associated with a large irrigation project. Meneely studied the contribution of precipitation to the aquifer. Anderson calculated discharge from the aquifer to the Spokane and Little Spokane Rivers to be about 470 and 250 ft^3/s, respectively.

Broom (1951) and McDonald and Broom (1951), analyzed gaging-station records for the Spokane and Little Spokane Rivers for the 1950 water year (Oct. 1, 1949–Sept. 30, 1950). In addition to calculating the net annual gains and losses of the rivers, they observed large variations in the directions as well as amounts of flow between the Spokane River and the aquifer along various stretches of the river.

Fader (1951) compiled water-level data from wells in the Rathdrum Prairie of Idaho and in Pend Oreille, Hayden, and Coeur d'Alene Lakes, and Weigle and Mundorff (1952) compiled well records and data on water levels and water quality for wells in the Washington part of the aquifer.

In 1953, Newcomb used seismic profiles near the Washington-Idaho State line to estimate the thickness of the aquifer. His interpretations indicated a thickness of about 340 to 376 feet near the State line.

Thomas (1963) estimated a total of 1,200 ft^3/s inflow to the aquifer in 1959, exclusive of recharge from Pend Oreille Lake. He estimated total discharge to be 1,450 ft^3/s, which led to an indirect estimate of 250 ft^3/s of recharge from Pend Oreille Lake. Walker (1964) suggested the existence of an additional source of recharge from the Hoodoo Valley.

Frink (1964) evaluated the sources of recharge and agreed with Anderson (1951) that Pend Oreille Lake was only a minor source of recharge, about 50 ft^3/s. Frink also suggested that at least 600 ft^3/s of recharge occurred east of Post Falls, Idaho, and another 150 ft^3/s occurred between Post Falls and the State line.

Rorabaugh and Simons (1966) found that the ground-water flow to the rivers varied according to the water table altitude and predicted a decline of about 12 ft/yr in the aquifer if all recharge ceased.

The literature continues to show a conflict over the importance of Pend Oreille Lake as a recharge source. Pluhowski and Thomas (1968) developed a ground-water budget for the aquifer and assigned a recharge rate of 51 ft^3/s from Pend Oreille Lake in order to balance the budget. They also state that the contribution from the lake might be as great as 200 ft^3/s and they estimate that the ground-water flow at the State line at about 1,000 ft^3/s.

Cline (1969) estimated that the 1964 water use from the aquifer near Spokane was about 8 billion gallons per year (34 ft^3/s), and concluded that this rate of use had very little effect on the hydrologic system.

Hammond (1974) determined that the ground-water flow southward from Pend Oreille Lake and Spirit and Hoodoo Valley was confined between Twin Lake and Round Mountain. Earlier authors assumed that the aquifer extended eastward around Round Mountain. Hammond based his conclusion on his apparent identification of bedrock as occurring at relatively high elevations and underlying the unconsolidated materials east of Round Mountain. This theory was supported by the high water-level altitudes in wells tapping these unconsolidated materials, which indicated that the materials were a source of recharge to the aquifer but were not part of the aquifer.

In 1978, Drost and Seitz, in cooperation with the U.S. Environmental Protection Agency, compiled information on aquifer characteristics, water quality and water usage.

Whitehead and Parliman (1979) compiled data for hydrogeologic conditions, groundwater quality, cultural elements and pollution sources in Idaho. Using this information, they calculated a “hydrologic unit priority index” to rank the 84 hydrologic units of the state according to pollution potential. The Rathdrum Prairie Aquifer ranked third highest on this list.

Graham and Campbell (1981) further characterized the aquifers of Idaho in relation to media and groundwater resources and groundwater flow systems. Data from this report further substantiates the high pollution potential of the Rathdrum Prairie Aquifer.

Hydrogeological Setting

The aquifer is thought to be underlain in most places by the fine-grained sediments of the Latah formation, which has much lower permeability and, in general, is bounded laterally by consolidated bedrock of very low permeability. In some areas, however, the boundaries of the aquifer are more gradational, with the highly permeable deposits or sand and gravel grading laterally into less permeable unconsolidated materials.

The thickness of the aquifer is still not known. Previous geophysical surveys indicate a thickness of about 375 feet of alluvial fill near the state line. Since the water table is about 120 feet below land surface in this area, the saturated thickness of the aquifer amounts to about 255 feet. Since the aquifer is highly productive, few wells need to penetrate more than a few tens of feet below the water table in order to obtain the amount of water required. As a result, the full thickness of the aquifer elsewhere has not been penetrated by wells, except near the margins where the fill is relatively thin.

Aquifer Boundaries

The general boundaries of the aquifer are shown on Figure 3, but require some explanation. The boundary of the aquifer on the east side of the Rathdrum Prairie is somewhat arbitrary because of the nature of the underlying unconsolidated material, which is not considered part of the aquifer. These materials are relatively thin and are thought to directly overlie bedrock. As a result, the water table in this area (the Chilco Channel) is considerably higher than in the main body of the aquifer and probably represents an area of recharge to the main aquifer. Similar reasoning can be extended to the tributary valleys containing Spirit, Twin and Hauser Lakes on the west side of the Rathdrum Prairie. Boundaries were not drawn across the Spirit and Hoodoo Valleys because of insufficient subsurface data. Elsewhere, the boundaries represent the contact between the permeable valley fill material and the relatively impermeable bedrock bounding the valley.

Water Levels, Depth to Water and Direction of Groundwater Movement

The water table slopes from Hoodoo Valley and Pend Oreille Lake in a generally southerly and south-southwesterly direction to the Idaho-Washington state line. The water table slopes about 20 feet per mile from the northern extremity of the aquifer to about Round Mountain, then establishes a more modest slope of between 2-10 feet per mile from Round

Mountain to the state line. Approximate water table elevations range from about 2,180 feet above mean sea level in the northern part of the aquifer in Idaho to an elevation of about 1,980 feet at the state line. Water level contours shown on Figure 3 represent lines of equal water level elevation. Water moves down-gradient, generally perpendicular to the contour lines, as shown by the arrows indicating the general direction of movement.

Water levels fluctuate due to many influences of both a long-term and short-term nature. Examples of long-term influences include variations in recharge to the aquifer due to increased or decreased precipitation and development of groundwater for irrigation or municipal use. Short-term influences include seasonal pumpage for irrigation and high losses of water from the Spokane River during high flow periods of runoff. In general, water level fluctuations are less than 30 inches per year in most areas, with the larger fluctuations usually in those wells closest to the Spokane River, occurring in response to changing stages of the river. Although data are not plentiful, it appears that there has been no long-term decline in water levels anywhere within the Rathdrum Prairie Aquifer.

Depths to water from land surface range from a maximum of about 300-400 feet in the northern portion of the aquifer to about 153 feet in the vicinity of the state line (Figure 4).

Groundwater Hydraulics and Movement

Two major terms are commonly used to describe the hydraulic characteristics of an unconfined aquifer: transmissivity, the rate at which water is transmitted through a unit width of the aquifer under a unit hydraulic gradient; and specific yield (or storage coefficient), the volume of water which will drain by gravity from a unit volume of the saturated aquifer material. Values for transmissivity based on results of pumping tests are about 13 million feet squared per day (ft.^{2}/day) near the Idaho-Washington state line. Transmissivities calculated by the USGS computer model indicate a transmissivity of about 3.3 million ft.^{2}/day. Values elsewhere in the Idaho portion of the aquifer range from 270,000 to 11 million ft.^{2}/day (Drost and Seitz 1978, p.8). Specific yield of the aquifer material could not be accurately calculated using the available data, but typical values for alluvium range from 0.1 to 0.3. In most of the aquifer, the values are expected to be in the highest part of this range. These figures indicate that the Rathdrum Prairie Aquifer has some of the highest transmissivities and storage coefficients within the state. Table 1 gives values of transmissivities for selected aquifers around the state.

Groundwater velocities through the permeable valley fill are calculated to be relatively high. For the aquifer near the state line, using values of transmissivity determined above, aquifer width and water table gradient, the calculated groundwater velocity is about 64 ft./day. The U.S. Army Corps of Engineers, using different data, indicate that the velocity could be as high as 90 ft./day (U.S. Army Corps of Engineers, 1976). Total flow through the aquifer at the state line is estimated to be about 960 cubic feet per second (cfs), which agrees closely with the estimate of between 930-1,010 cfs obtained using the groundwater budget approach.

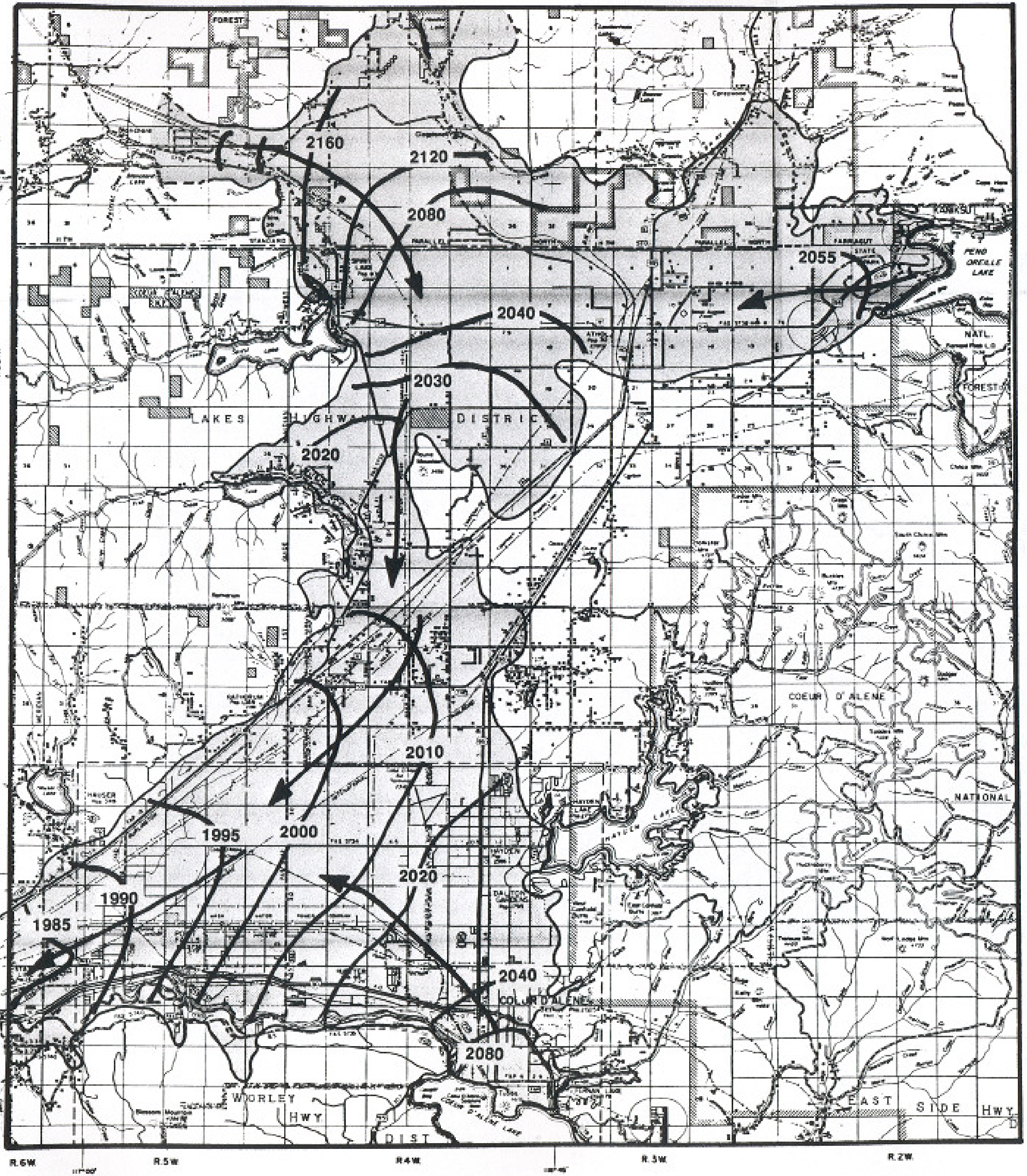


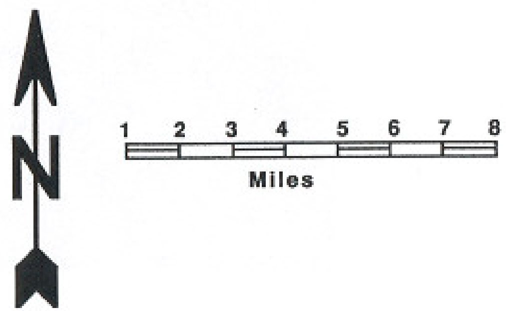
FIGURE 3. Map of Rathdrum Prairie Showing Aquifer Boundries, Water-Level Altitudes and Generalized Groundwater Flow Directions.

Explanation

Rathdrum Prairie Aquifer

2000 Water Level Contour (altitude of water table above mean sea level)

Generalized Direction of Groundwater Flow



Base Map: General Highway Map of Kootenai County, Idaho Department of Transportation

Hydrology Modified from Drost and Seitz 1978

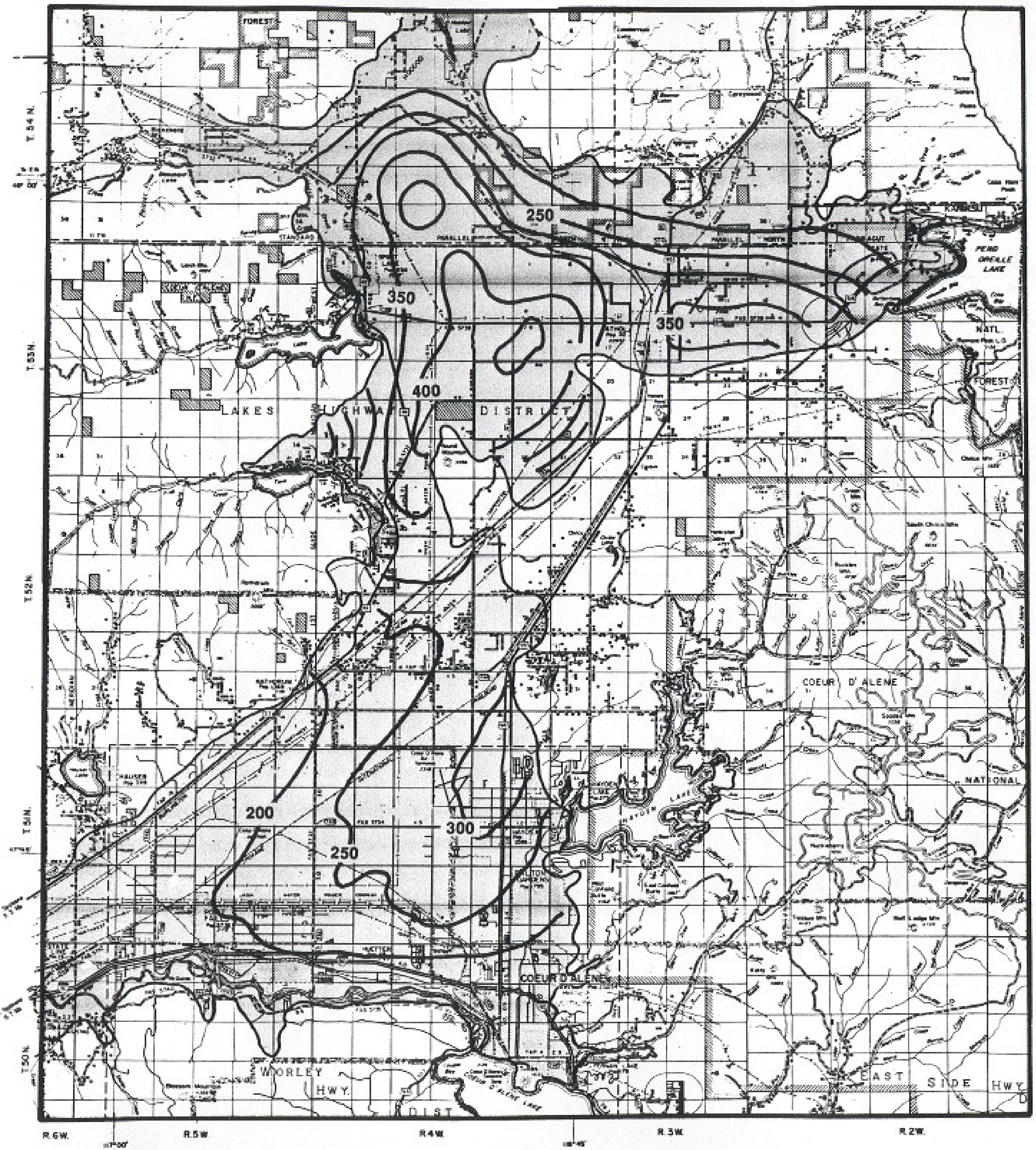


FIGURE 4: Map of Rathdrum Prairie Aquifer Showing Depth to Water

Explanation

Rathdrum Prairie Aquifer

Contour Lines Showing Depth to the Water Table (contour interval is 50 feet)

N

1 2 3 4 5 6 7 8

Miles

Base Map: General Highway Map of Kootenai County, Idaho Department of Transportation

Hydrology by Idaho Department of Water Resources.
Data from U.S. Geological Survey, Water Resources Division and Idaho Department of Water Resources.

TABLE 1
VALUES OF TRANSMISSIVITY AND STORAGE COEFFICIENT FOR
SELECTED AQUIFERS IN IDAHO

AQUIFER	TRANSMISSIVITY (ft.^{2}/d)	STORAGE COEFFICIENT (DIMENSIONLESS)
1. Snake Plain Aquifer	500,000 to 13 million	3×10^{-2} to 1.7×10^{-5}
2. Glenns Ferry Formation, Nampa-Caldwell area	18,000 to 230,000	0.23 to 1×10^{-4}
3. Alluvial aquifers, upper Henry's Fork basin	670 to 23,000	
3. Basalt aquifers, upper Henry's Fork basin	200 to 8,700	
3. Rhyolite flows and tuffs, Upper Henry's Fork basin	400 to 12,000	
4. Pullman-Moscow Aquifer	3,300	1×10^{-4}
5. Bighole Basalt and Sunbeam Formation, eastern Michaud Flats	19,600 to 444,000	
6. Salt Lake Formation and Raft River Formation, southern Raft River basin	3,200 to 46,800	1.8×10^{-3} to 5.3×10^{-3}
7. Camas Prairie alluvial	9,400	
8. Rathdrum Prairie	130,000 to 13 million	

1. Mundorf et al., 1964
2. Nace et al., 1957
3. Whitehead, 1978
4. Smoot, 1987
5. Jacobson, 1984
6. Morilla and Ralston, 1975
7. Walton, 1962
8. Hammond, 1974

Recharge To and Discharge From the Aquifer

Yearly discharge from the aquifer due to pumping and river gains is approximately 954,000 acre feet. This is essentially balanced by recharge from valley underflow, precipitation and irrigation diversions (Table 2 and Figure 5).

TABLE 2*
RECHARGE TO AND DISCHARGE FROM
THE RATHDRUM PRAIRIE AQUIFER

RECHARGE	ACRE FEET PER YEAR	DISCHARGE	ACRE FEET PER YEAR
Flow into the aquifer from adjoining areas (chiefly valley underflow)	580,000		
Precipitation minus evapo-transpiration on the land surface above the aquifer in Idaho	94,000	Total pumping loss in Idaho	35,000
Inflow from surface water diversions (recharge by water diverted from Spokane River east of Post Falls and applied to land surface above the aquifer	36,000	Underflow to Spokane Valley Aquifer (underflow assumed to be equal to recharge less pumpage)	675,000
TOTAL	710,000		710,000

(*Modified after Drost and Seitz, 1978.)

Part of the water that flows into Coeur d'Alene, Pend Oreille, Spirit, Twin, Hayden and Hauser Lakes is evapotranspired, some is diverted, some increases storage in the lakes or becomes surface runoff and some percolates into the ground and becomes groundwater recharge. Seepage losses from the Spokane River between Post Falls and the state line also constitute a major source of recharge. An additional source of recharge comes from diversions of surface water for irrigation, particularly in the vicinity of Post Falls. Both seepage losses and irrigation diversion losses below Post Falls benefit only a small part of the aquifer in Idaho; the major benefit is felt in Washington.

These recharge sources initially flow through the aquifer as two separate channels, one channel coming from the northwest and the other from the southeast (Figure 3). The letter consists almost exclusively of infiltration from Coeur d'Alene Lake and the Spokane River. This channel, with a flow of approximately 250 cfs, merges with the larger channel, with a flow of 475 cfs, just west of the city of Coeur d'Alene.

Approximately 95 percent of the water in the aquifer leaves the state as underflow and is eventually discharged to the Spokane River or Little Spokane River in Washington or escapes as groundwater underflow near Nine Mile Falls, Washington. Although some water may be lost to the underlying Latah formation, the amount of this loss is thought to be insignificant.

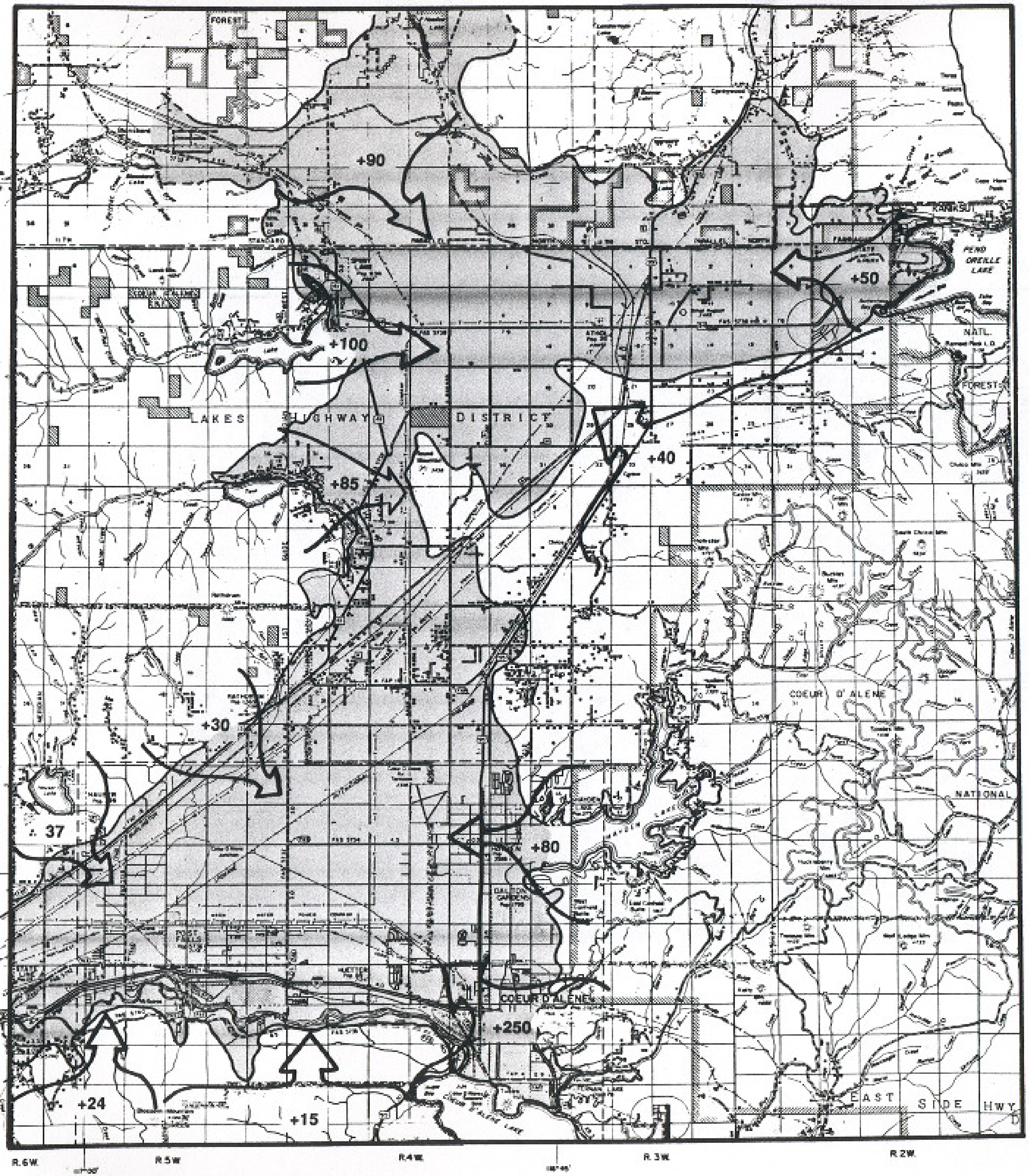


FIGURE 5: Map of Rathdrum Prairie Aquifer Showing Estimated Rates of Recharge

Explanation

Rathdrum Prairie Aquifer

+250 All numbers are in Cubic Feet per Second

Flow into the Aquifer from Adjoining Areas

+ 130 Net Recharge to the Aquifer due to Precipitation minus Evapotranspiration

1 2 3 4 5 6 7 8

Miles

N

Base Map: General Highway Map Of Kootenai County, Idaho Department of Transportation.

Hydrology Modified from Drost and Seitz 1978

Most of the water moving through the aquifer eventually discharges to the Spokane and Little Spokane Rivers, although where and how this occurs has not yet been fully defined. Broom (1951) and McDonald and Broom (1951) analyzed gauging station records from an expanded gauging network and estimated the amounts and locations of water being transferred from the aquifer to the river and vice versa. Their analyses showed there were large variations during the 1950 water year, not only in the magnitude of flow but also in the direction of flow. These variations take place most years and result from the relative levels of both the river stage and water table.

Chapter 4. Climate and Soils

Soils and climate are important to the water quality of the Rathdrum Prairie Aquifer. Soils store some of the moisture from precipitation for plant growth, thus reducing infiltration to groundwater. Soils are also media for the retention of nutrients and potential contaminants. Some potential contaminants are decomposed by the biological activity within the soil, thus preventing their entry into the groundwater system. The kinds of parent materials from which soils form, interacting with climate, give rise to soil characteristics that are important to water movement and potential contaminant retention and decomposition. These characteristics are soil depth, slope, texture, drainage, permeability, reaction (pH), cation exchange capacity, and organic matter content.

Climate

The climate is subhumid Mediterranean, with cold moist winters and dry summers. The average annual precipitation is about 24 inches at the southwest extreme and 33 inches in the northern part (Table 3). The months of November, December and January, have the highest precipitation, receiving about 3 to 5 inches of precipitation per month. This is mainly as snow (an average of 88 inches per year), which usually remains on the ground until early spring thaw. The spring months have about 2 to 2.5 inches of rain per month. This combined moisture usually enters into the soil in a period of about 2 weeks during the melt period, which is normally late February or March. This period gives the highest recharge. During the months of June, July, August and September, the evapotranspiration exceeds precipitation.

TABLE 3
MONTHLY PRECIPITATION NORMALS IN THE VICINITY OF THE RATHDRUM PRAIRIE AQUIFER, 1941-1980*

STATION	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	TOTAL
Coeur d'Alene	1.90	3.06	3.75	3.88	2.40	2.10	1.65	2.07	1.89	.74	1.24	1.11	25.79
Bayview Motel Basin	2.04	2.72	3.37	3.30	2.31	1.80	1.58	1.92	1.83	.82	1.23	1.28	24.20
Sandpoint	2.67	4.34	5.03	4.64	3.32	2.55	2.08	2.30	2.13	1.01	1.57	1.69	33.33

*Source: Climatology of the United States No. 81, National Oceanic and Atmospheric Administration, September 1982.

The climate in the mountains, east of the aquifer and in the watershed that drains into the aquifer, is mainly humid Mediterranean bordering on Continental. The mountains receive 24 to 80 inches of precipitation. Precipitation from November through April is in the form of snow. Snow on south slopes melts off in early spring, with snow on north slopes melting later, providing stream flow into the summer months. The maximum snowmelt period is April and May.

Soil Formation

Soils are a product of an interaction between the kinds of parent material from which they are formed, the climate and the biological conditions under which they developed. Topography and total development time are critical factors in soil development. Nearly all of the soils on the Rathdrum Prairie Aquifer formed in loess containing volcanic ash which overlies extremely gravelly sand that was deposited during a catastrophic flood event during the glacial melt period. These alluvial deposits are known as the “Missoula Flood Deposits.” The soil characteristics are discussed generally with the more detailed descriptions of the soils in the appendix.

Soil Thickness and Slopes

The soil depth and thickness of the soil column are important to water storage and contaminant retention and decomposition. Soils of the Rathdrum Prairie Aquifer are typically gravelly or very gravelly silt loam or loam that overlies extremely gravelly sand C-horizon at depths of 29 to 40 inches. Small areas in swales and toes of slopes are deeper than 40 inches to the loose, extremely gravelly sand. On some convex ridges, there are small areas where the depth to the loose, extremely gravelly sand is less than 20 inches.

Most of the Rathdrum Prairie is nearly level (0-2 percent) to moderately sloping (2-7 percent); and in these areas, most of the water infiltrates rather than runs off, except when the ground is frozen. A few steeper areas along drainageways and foothills have some runoff. The steeper the slope, the greater the runoff.

Soil Texture

Soil texture affects the amount of water, nutrients and potential contaminants that the soil can store.

The surface soil textures are mainly silt loams or gravelly silt loams. The silt contains a high amount of volcanic ash that has weathered to allophane can hold more moisture than soils without the ash.

Drainage and Permeability

Nearly all of the soils are well or excessively well-drained. A few small areas adjacent to streams or some concave areas are wetter.

Soil permeability (or rates that water moves through the soil) is mainly moderate in the soil and rapid or very rapid in the underlying extremely gravelly sand. There are no significant limiting layers or clay layers to interrupt the downward movement of water and contaminants.

Soil Reaction (pH) and Cation Exchange Capacity

Soil reaction (pH) and cation exchange are important soil characteristics that affect the ability of soil to store nutrients and potential contaminants. The soil pH ranges from 5.6 to 7.4. Most of the underlying extremely gravelly sand has pH values of 6.6 to 7.4. The upper two to four feet of the underlying extremely gravelly sand has iron coatings on the sand and gravel particles. These coatings may mostly immobilize phosphorus and some heavy metals.

The cation exchange capacity (CEC) of soils refers to the soil capacity to store or release positively charged ions (cations). The CEC is determined by soil properties such as organic matter content, clay content, kind of clay and allophane. Most of these soils are medium or high in organic matter and also have a large amount of volcanic ash that has weathered to allophane, in the silt and thus have high or very high CEC.

Organic Matter

Soils in this area generally contain 1 to 4 percent organic matter. Organic matter content of the soil is important to the control of surface water and subsurface water pollution. Organic matter in the surface soil tends to promote aggregation and improve soil tilth. Soils with high organic matter have a higher capacity for storing water, thus reducing the leaching of water containing contaminants. Infiltration of water into soils is generally greater if there is aggregation, thus reducing runoff and erosion. Organic matter also has a high CEC, thus increasing the ability of the soil to store nutrients and potential contaminants. Contaminants such as some pesticides biologically decompose more readily in soils with high organic matter.

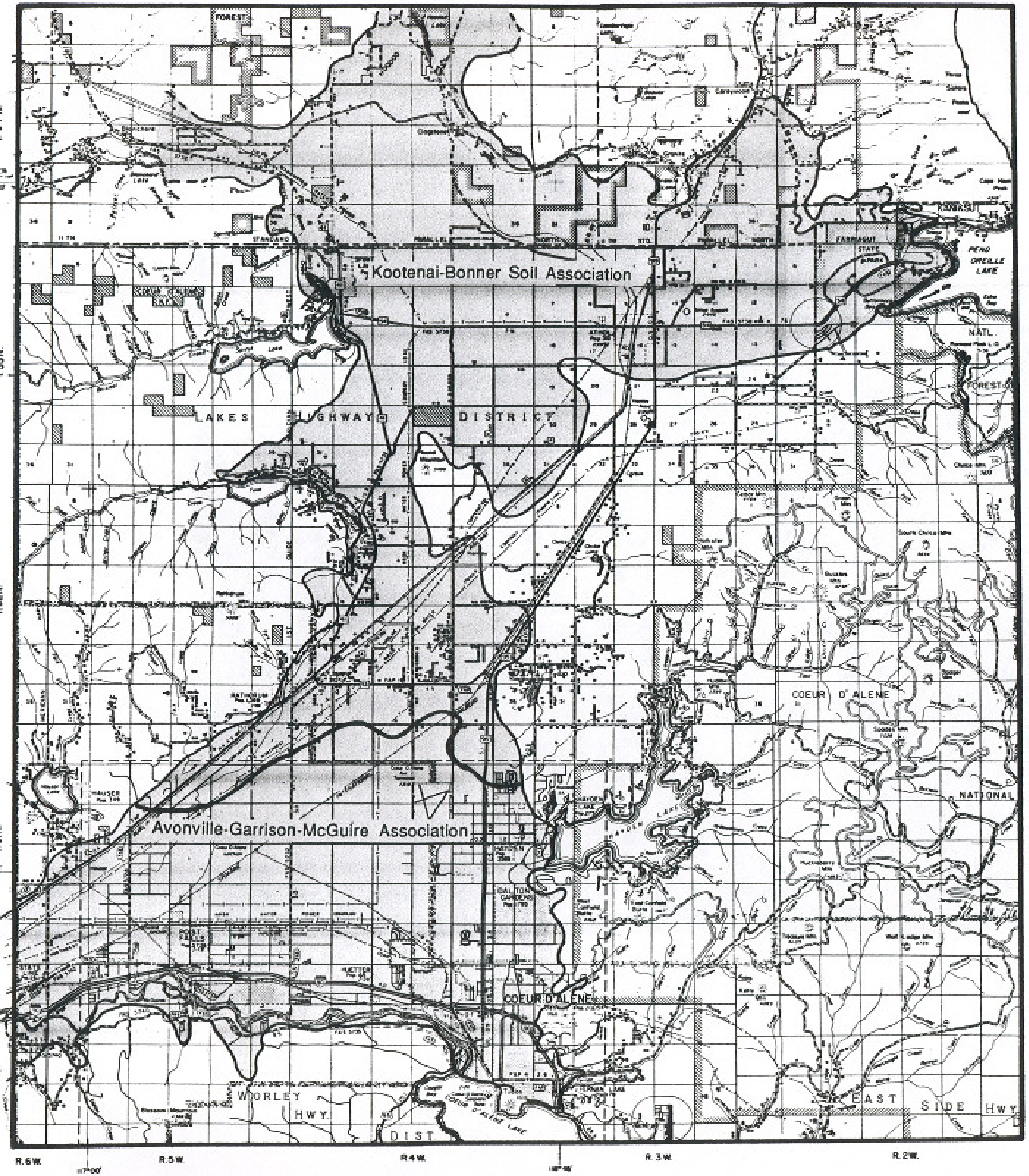
Summary of Soil Characteristics

The major soil units of the Rathdrum Prairie Aquifer are: (1) Kootenai-Bonner association and (2) Avonville-Garrison-McGuire association (Figure 6). These soils and characteristics are discussed in more detail in the Appendix 1.

The soils of the Rathdrum Prairie provide some protection from the normal application of pesticides and most fertilizers. The surface soils have a high cation exchange capacity due to the organic matter and allophane content. Cationic contamination, such as heavy metals and fertilizers will likely be sorbed or attenuated within the soil. The allophane will retain phosphorus. Excessive application rates of chemical or spills could possibly result in some material moving through the soil into the underlying extremely gravelly material. Because there are no limiting layers, the material has the potential of being leached into the groundwater. Excessive nitrates applied as fertilizer will migrate through the soils with the soil water. These soils will generally treat the pathogens in septic tank effluent, but the nitrates will not be contained and can potentially leach into the groundwater.

The potential is high for the late winter and early spring melt water and precipitation to migrate through the soil and recharge the groundwater. Any residual pesticide and fertilizer that is water soluble will potentially leach with the migrating soil water. Some persistent organic chemicals may move through the soil into the subsurface.

FIGURE 6. Map of Rathdrum Prairie Aquifer Showing Soil Dristributation



Explanation

Rathdrum Prairie Aquifer

Kootenai-Bonner Soil Association: Well-drained soils formed in glacial outwash mantled with loess and volcanic ash.

Avonville-Garrison-McGuire Association: Well-drained to excessively well-drained soils formed in glacial outwash with a mantle of loess and volcanic ash.

N

1 2 3 4 5 6 7 8

Miles

Base Map: General Highway Map of Kootenai County, Idaho Department of Transportation.

Soil Information from Soil Conservation Service General Soils Map.

Chapter 5. Land Use and Groundwater Use

The Rathdrum Prairie extends east and then northeast from the Washington state line to northern Kootenai County, Idaho. Kootenai County is the geographic population and commercial center of the five northern counties of Idaho. Nine principal municipalities are located on the boundary of the Rathdrum Prairie Aquifer which covers 283 square miles. The prairie varies from 5 to 17 miles in width and is bounded on both sides by mountainous terrain and numerous lakes. Roughly half (69,000) of the people in northern Idaho live in Kootenai County and the majority of these (over 80 percent) live on the broad long prairie covering the north end of the county between two mountain ranges. Table 4 summarizes population distribution and shows growth characteristics in the area. The population of Kootenai County has doubled from 1970 to 1985. The county is dotted with small towns around the perimeter of the prairie with the majority of growth occurring along the Spokane River and north of Coeur d'Alene. The two largest towns, Coeur d'Alene and Post Falls, are within two miles of each other and Hayden and Dalton Gardens are less than a mile north of Coeur d'Alene.

Since 1980, the population growth has shifted back into the towns with 56% of the populace living in incorporated areas. The largest percent of growth occurred in Post Falls and Hayden.

TABLE 4
MAJOR POPULATION CENTERS IN KOOTENAI COUNTY
POPULATION SUMMARY, 1970-1985*

INCORPORATED COMMUNITY	POPULATION 1970	1975	1980	1985	PERCENT INCREASE ('70-`85)
Athol	190	231	309	286	51
Hayden Lake	260	302	270	306	18
Hauser	349	433	306	294	-16
Spirit Lake	622	730	830	806	30
Rathdrum	741	957	1,319	1,629	120
Hayden	1,285	1,711	2,353	3,362	162
Dalton Gardens	1,559	1,867	1,779	1,955	25
Coeur d'Alene	16,228	17,994	19,434	23,700	46
	23,605	28,255	32,206	38,933	

Prins and Lustig, 1987.

Except for the southern and eastern perimeter of the prairie, which is occupied by a series of small- to moderate-sized towns with interconnecting transportation arteries, the majority of the prairie surface is utilized for agricultural purposes, primarily the growing of grass seed and hay crops, with a number of small- to medium-sized cattle ranches. Irrigation in these agricultural areas are from both surface and groundwater sources.

The Spokane River, which flows along the southern perimeter of the aquifer, is the only major watercourse on the prairie. Along its length are four major lumber mills and several plywood and veneer plants. These mills process logs hauled from the adjacent mountains. These lands are held predominantly by the U.S. Forest Service, state Department of Lands with some private ownership by timber companies.

The lumber, logging and agricultural industries are the mainstays of the economy, supplemented by the seasonal tourist recreational industry. The summer tourist trade is centered on the six major lakes around the edges of the prairie. Primarily, there are summer homes and fishing cabin resorts with an assortment of scout and church summer camps. These lakes supply fresh water for a variety of recreational activities as well as drinking water supplies.

Groundwater is nearly the sole source of water supply for agricultural and domestic users on the Rathdrum Prairie. All nine municipalities and an assortment of independent water districts obtain a majority of their water supply from the aquifer providing domestic, commercial and light industrial water supply to almost 55,000 people. The East Greenacres Irrigation District has several clusters of turbine wells that supply irrigation water to hundreds of square miles of grass seed growing farms. There are hundreds of individual wells serving small unincorporated areas and individual farms and ranches.

In 1975, the U.S. Geological Survey estimated that public water suppliers pumped approximately 1.2 billion gallons of water from the Rathdrum Prairie Aquifer. This served approximately 33,400 people with water for domestic, irrigation and industrial purposes.